Claims

1. A biomolecular complex comprising at least two functional elements (FE_1, FE_2) each attached to a target molecule or area (T) through binding elements (BE), **characterized** in that each FE is attached to a specific BE, said BE being a nucleotide sequence and the target molecule or area comprises the corresponding target sequence, and the target molecules or areas being separated from each other by a first linker or spacer (L) being a nucleic acid polymer having a pre-determined physical property.

2. Biomolecular complex according to claim 1, wherein said at least two functional elements (FE_1, FE_2) are the same, and that they are attached to a corresponding number of target molecules / target areas, separated by linkers, forming a multimer of said functional elements.

3. Biomolecular complex according to claim 1, wherein at least one of said functional element and corresponding binding element is separated from each other by a second linker (*l*).

4. Biomolecular complex according to claim 1, wherein the pre-determined physical property of the linker is chosen among: length, secondary structure, tertiary structure, charge, hydrophilicity /hydrophobicity, or a combination thereof.

5. Biomolecular complex according to claim 3, wherein said second linker (l) or spacer is a linker compatible with methods of peptide synthesis.

6. Biomolecular complex according to claim 1, wherein the target area comprises a marker, chosen among a reporter gene, a fluorescent label, and a radioactive label.

7. Biomolecular complex according to claim 1, wherein the functional element is chosen among a natural or synthetic peptide, a lipid, a glycoprotein, a receptor ligand, and a fraction of any of the preceding.

8. Method for the production of biomolecular complexes, comprising the steps of forming a stock solution of a first functional entity,

a) forming a stock solution of a second functional entity,

b) forming separate stock solutions of at least two binding entities,

c) forming separate stock solutions of nucleic acid molecules as linker molecules, each solution containing a linker having a distinct physical property,

d) reacting said first functional entity with at least one binding entity,

e) reacting said second functional entity with at least one binding entity, other than the binding entity in e)

f) repeating steps e) and f) for each functional entity,

g) reacting each linker molecule with at least two target molecules / target areas, capable of specific binding to the binding entities of e) and f)

h) reacting each combination of functional entity and binding entity with each linker, and

i) repeating step h) in order to form a library of combinations of functional entities and linkers.

9. Method for the production of biomolecular complexes, comprising the steps of

i) synthesis of a molecular combination of a first functional entity and a first binding entity,

ii) synthesis of a molecular combination of said first functional entity and a second binding entity,

iii) synthesis of a molecular combination of a second functional entity and said first binding entity,

iv) synthesis of a molecular combination of a second functional entity and said second binding entity,

optionally repeating steps i) – iv) for further functional entities and binding entities and forming stock solutions thereof,

v) synthesis of a nucleic acid molecule as a linker connecting a first and second target area, and

vi) self-assembly of the molecular combinations of any one of step i) – iv) to the linker of step v) in the desired configuration by addition of these to said linker in solution.

10. Method according to any one of claims 8 - 9, wherein the linker molecule comprises a marker or label chosen among a reporter gene, a radioactive label, and a fluorescent label.

11. Method according to any one of claims 8 - 9, wherein the binding entities are PNA sequences.

12. A combinatorial library produced by the method according to any one of claims 8 - 9.

13. A combinatorial library according to claim 12, wherein the functional entities are chosen among a natural or synthetic peptide, a lipid, a glycoprotein, a receptor ligand, and a fraction of any of the preceding.

14. Method for the screening of receptors with respect to their involvement in the internalisation of substances in eukaryote cells, **characterized** in that that a complex according to claim 1 is used, the functional elements substituted by ligands presumed to interact with said receptors.

15. Method for the screening of receptors with respect to their involvement in the internalisation of substances in prokaryote cells, **characterized** in that a complex according to claim 1 is used, the functional elements substituted by ligands presumed to interact with said receptors.

16. Method for the study of inter-molecular interactions under physiological or near-physiological conditions, **characterized** in that the molecules of interest are inserted as the functional entities (FE) in a complex according to claim 1, and the orientation and distance between the molecules is varied by varying at least one of the first and second linker (L, *l*).

17. Drug delivery vectors produced using the method according to any one of claims 8 - 9.

18. Drug candidates identified using the method according to any one of claims 14 - 16.

19. Drug delivery vectors produced using a combinatorial library according to any one of claims 12 - 13.

20. Drug candidates identified using a combinatorial library according to any one of claims 12 – 13.